

## RESEARCH ARTICLE

## Use of migration and mobility data in COVID-19 response: Evidence from the East Africa Community region

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## Abstract

COVID-19 pandemic has given rise to unprecedented challenges to global health and mobility. A valuable lesson from this recent pandemic is that migration statistics can be relied on to illuminate the spread of an epidemic and model diffusion patterns once a highly contagious virus is detected in a country. This study reviews literature published between 2020 and 2021, giving insights into the generation and use of migration and mobility data in COVID-19 response in the East Africa Community (EAC). The reviewed studies regarding the EAC Regional COVID-19 Response Plan all point to the need for timely data, but do not specify requirements for mobility and migration statistics. Several studies featured in this review propounded innovative ways to obtain and use the data in COVID-19 modeling. The study concludes that there is potential for use of migration statistics in future pandemic response plans and recommends that the EAC mainstreams migration statistics within the pandemic response processes.

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## 1. Introduction

As the coronavirus disease 2019 (COVID-19) pandemic started to take hold of the world in December 2019, no one has anticipated the unprecedented effects that it brought on global health and mobility, which confirm the inextricable connection between migration, health, and human mobility. The first confirmed case of COVID-19 was recorded in the Chinese city of Wuhan, and the virus responsible for this infectious disease, called the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), had swiftly swept the globe. In Africa, the first case of COVID-19 was reported in Egypt in February 2020 and later that same month in Nigeria.

The first cases of the COVID-19 in the East African Community (EAC) region were reported in March 2020 in Burundi, Kenya, Rwanda, Tanzania, and Uganda (Musabaganwam et al., 2021; Habonimana et al., 2020; Republic of Health Kenya, 2020a; Olum & Bongomin, 2020; Tarimo & Wu, 2020). The immediate response was a raft of containment measures to limit human mobility evidenced by the closure of international borders and restriction of movement within national borders. While Kenya,

Rwanda, and Uganda implemented these containment measures immediately, Tanzania and Burundi took a different approach, by playing down the significance of the pandemic, due to political reasons (Brima, 2021). By June 2020, Rwanda began implementing the protection measures such as health messaging, while Tanzania later set up a COVID-19 response taskforce almost a year later, in April 2021 (Manirambona *et al.*, 2021).

The spread of COVID-19 pandemic is closely tied to global mobility, as migration played a key role in the spread of the virus across the globe (Benton *et al.*, 2021; De Bruin *et al.*, 2020). As different countries unilaterally or within coalitions put in place mitigation measures to manage the pandemic, it is necessary to understand how mobility and migration data were accessed and utilized in the COVID-19 mitigation measures. The migration and mobility data serve to identify recent travelers and their close contacts as well the population at risk of infection, which are important determining factors for implementing mitigation measures. For example, in many countries, once a victim was positively identified to have contracted COVID-19, information such as travel history and possible contacts made during the travel will be collected. This way, COVID-19-positive individuals will be monitored during quarantine and their contacts traced to prevent the infection from dissemination to others (Nachega *et al.*, 2021; Braithwaite *et al.*, 2020; Jordana & Triviño-Salazar, 2020).

Pandemics pose serious public health challenges and usually require instant, accessible data to inform planning and formulate suitable response, and mitigation measures (Pergolizzi *et al.*, 2021; Desai *et al.*, 2019). Response efforts require granular data which, at times, are unavailable; therefore, model-derived proxies of mobility are commonly employed. Perez & Dragicevic (2009) developed such a model based on community mobility flows to predict the spread of communicable disease in Canada. Such agent-based models have been applied to model the spread of COVID-19 in the Global North countries (Hoertel *et al.*, 2020; Venkatramanan *et al.*, 2018). For example, Fortaleza *et al.* (2021) used health geography modeling technique to understand the early dispersion of COVID-19 in São Paulo, Brazil, using COVID-19 surveillance data to model the spread within the municipalities combined with tracking of air travel into and out of Brazil. Their results showed that SARS-CoV-2 virus spread within Brazil due to increased movement of people to regions with better transport infrastructure, with higher cases being initially reported in the bigger cities before spreading to smaller ones.

The Global Compact on Safe, Orderly, and Regular Migration (GCM) is a negotiated treaty adopted by 152

countries, focusing on the management of migration. The GCM reiterates the importance of data on migration, with the first objective tasking member states to collect and utilize accurate and disaggregated migration data as a basis for evidence-based policies (UN, 2018). Guided by the already-known connection between human mobility and global dissemination of virus, the COVID-19 pandemic provides a timely opportunity to explore whether migration and mobility data available in a timely, accurate, and disaggregated manner can inform suitable policy response to the pandemic.

This systematic review of literature focuses on the preliminary response to the COVID-19 pandemic between 2020 and 2021, examining how migration and mobility statistics were incorporated to strengthen the response plans. The centerpiece of this review reflects the necessity of intelligently applying timely and disaggregated data for evidence-based decision making, which is the aspiration of the Global Compact for Migration. The next section of this paper details the methods and analytical approach, and the last three sections deal with the results, discussion, and recommendations for future pandemic response efforts.

The main objective of this review is to showcase the application of migration and mobility data in the management and response to the COVID-19 pandemic in the EAC region.

## 2. Data and methods

This systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines (Moher *et al.*, 2009). Studies were identified from the available electronic databases, including but not limited to, African Journals Online (AJOL), Google Scholar, Jstor, PubMed, and Medline. The review focused on studies conducted in Burundi, Kenya, Rwanda, Tanzania, and Uganda. Despite being a member state of the EAC, South Sudan was omitted in this review; additionally, studies conducted in the Democratic Republic of Congo, which had not yet been ratified as a member of the EAC regional economic bloc, were omitted from the review.

The review included published and gray literature that captures data on migration and mobility and its use in the management of COVID-19 within the countries of the EAC region from January 2020 to December 2021. This was complemented by literature found in health, mobility, migration, and health specialist platforms hosted by international or local organizations, including universities in the member states, as well as in data and research publications from the International Organization for Migration (IOM), through its Migration Research

Portal, the African Union (AU), the EAC, and the Intergovernmental Authority on Development (IGAD). This approach enabled the reconstruction of the COVID-19 response framework in the EAC region, which has important implications for data requirements for the response efforts. In this paper, COVID-19 management refers to a range of measures undertaken by the respective governments to track down COVID-19 victims, trace their contacts, and address other issues related to identification of persons with COVID-19. This review focuses on studies that tracked usage of migration and mobility data to not only manage COVID-19 but also forecast or model the internal diffusion of the virus.

The keywords used in literature search include “migration data,” “migration statistics,” “mobility data,” “mobility statistics,” “COVID-19,” “East African Community,” “EAC,” and the respective name of each EAC member state. The keywords were used to search for literature on the Internet. The abstracts, keywords, and methodology described in the selected studies after online search were rigorously reviewed, with particular emphasis on the availability and use of data and the limitations surrounding these aspects. The study selection process is outlined in [Figure 1](#).

The methodology sections of the selected papers were examined to evaluate the relevance of the manuscripts to the study objectives. Manuscripts that fulfilled the inclusion criteria were read, and the references cited in the selected manuscripts were screened through to identify other possible relevant manuscripts for inclusion in this systematic review. Adherence to the above-mentioned procedures helped preliminarily identify a total of 50 studies conducted in the EAC region, concerning the keywords “migration,” “mobility,” and “COVID-19.” The first-level screening involves the identification of duplicate articles by reviewing the titles and abstracts, and 17 articles were excluded from the preliminary set of studies. Thereafter, the remaining 33 articles were reviewed through full-text reading, and 15 articles were found to be ineligible as some of them focused on Africa as a region, while others featured epidemiological aspects of the SARS-CoV-2 virus, without reference to migration or mobility issues. Studies on the impact of COVID-19 on health, economics, and related subjects were omitted in this analysis, unless they specifically focused on mobility or migration data or statistics. After a thorough and careful article selection and multi-stage screening, a total of 18 studies were found relevant to the objectives of the systematic review and were, therefore, included in the qualitative analysis ([Table 1](#)).

The final 18 studies that met the criteria for the review were, further, analyzed to draw insights from

the available literature on how migration and mobility data were generated and utilized in the mitigation and management of COVID-19 in the EAC region, especially in every member state. The sampled studies show regional variations, with Kenya reporting more published studies on COVID-19 compared to the other countries in the EAC region. Of the five Kenyan studies cited in this paper, two were based on research conducted in urban informal settlements to monitor the effects of COVID-19 protocols, using telephone-based interviews conducted amongst residents of those areas; two studies focused on predictive modeling of COVID-19 in the country; while the remaining study used geospatial indicators to predict the social, environmental, and socioepidemiological vulnerabilities in the sub national units, which could inform the COVID-19 pandemic response. There is only one relevant study from Burundi that provides a summary of the COVID-19 measures adopted in the country. For Uganda, three studies were found relevant, with one focusing on ways to track COVID-19 spread in the country while the other two evaluating the trends of the pandemic in the country and the lessons learned. In Rwanda, only one study was relevant, depicting the management of COVID-19 in the country and the lessons learned. No relevant studies from Tanzania were found during the specified period. Several continental and regional studies, which included some of the EAC member states, were included in this systematic review. The main themes of these continental and regional studies revolve around COVID-19 preparedness and vulnerabilities of the different countries as well as the effectiveness of interventions.

## 3. Results

### 3.1. COVID-19 response architecture in the EAC region

The EAC regional response to the COVID-19 pandemic was based on the continental response plan, which was guided by the African Union Commission (AU) in partnership with the African Centers for Disease Control (Africa CDC) and the World Health Organization Regional Office for Africa (WHO/AFRO), who formed the Africa Taskforce for Coronavirus (AFTCOR) in February 2020 (Africa Union, 2020a). Comprising representatives of the AU and members of the national public health institutions of the member states, the Africa Taskforce launched the Joint Continental Strategy for COVID-19 Outbreak in 2020 following consultations of the Africa Taskforce (African Union, 2020b). The continental strategy had twin objectives: (i) To coordinate member states in their response; and (ii) to promote evidence-based public health practice for surveillance, prevention, diagnosis, treatment, and control of COVID-19 (African Union, 2020b:6). Collecting data for the purpose of managing

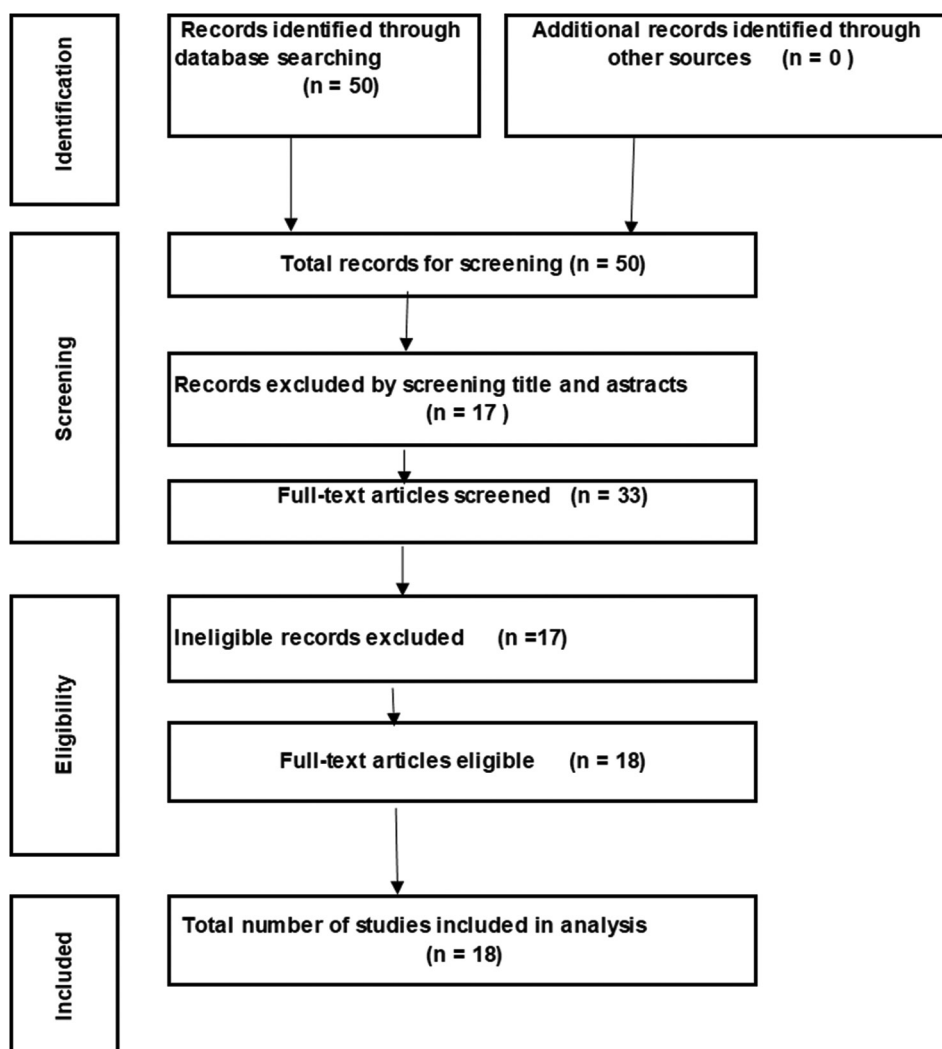


Figure 1. PRISMA flow diagram of selection of studies for systematic review

the COVID-19 pandemic was a top priority for AFTCOR, with “timely data” emphasized in the second objective (African Union, 2020b:4). Several critical initiatives, such as the Partnership to Accelerate COVID-19 Testing in Africa (PACT), Africa Medical Supplies Platform (AMSP), Consortium for COVID-19 Clinical Vaccine Trials (CONCVACT), and Africa Against COVID-19: Saving Lives, Economies and Livelihoods (African Union, 2020c; 2020d; 2020e; 2020f), were launched to ensure the seamless distribution of medical supplies and vaccines and the implementation of public health interventions.

Some of the key activities identified to manage COVID-19 include the increased surveillance through screening at entry points, and contact tracing, as well as adapting the health information systems for managing identified COVID-19 cases and contact data (African Union

2020b:2d). The AU pledged to work with member states to assess and manage issues related to “special populations” which encompass refugees and internally displaced persons, who form part of the migrant population (African Union 2020b: Section 2.7). To monitor the continental response efforts, AFTCOR contracted a global consortium, the Partnership for Evidence-Based COVID-19 Response (PERC), in March 2020, to conduct monitoring surveys on the accessibility, impact, and effectiveness of the COVID-19 public health, and social measures implemented at the country level, focusing on 20 member states of the AU (WHO/AFRO, 2021; Africa CDC, 2021a).

The COVID-19 pandemic came at a time when the EAC region had already experienced previous pandemics, where a collaborative network had already been established based on previous disease outbreaks to manage public health

**Table 1. Summary of studies included in the systematic review**

Region	Article title	Author(s), year
Burundi	Burundi's "Worst Enemy:" the Country's Fight Against COVID-19	Manirambona <i>et al.</i> , 2021
Kenya	Practical geospatial and sociodemographic predictors of human mobility	Ruktanonchai <i>et al.</i> , 2021
Kenya	Mobility Patterns During COVID-19 Travel Restrictions in Nairobi Urban Informal Settlements: Who Is Leaving Home and Why. <i>Journal of urban health:</i>	Pinchoff <i>et al.</i> , 2021
Kenya	Forecasting the scale of the COVID-19 epidemic in Kenya	Brand <i>et al.</i> , 2020
Kenya	The impact of COVID-19 control measures on social contacts and transmission in Kenyan informal settlements	Quaife <i>et al.</i> , 2020
Kenya	A vulnerability index for COVID-19: spatial analysis at the subnational level in Kenya	Macharia <i>et al.</i> , 2020
Rwanda	Lessons learned from Rwanda: innovative strategies for prevention and containment of COVID-19	Karim <i>et al.</i> , 2021
Uganda	Feasibility of using a mobile App to monitor and report COVID-19 related symptoms and people's movements in Uganda	Mugenyi <i>et al.</i> , 2021
Uganda	Uganda as a role model for pandemic containment in Africa	Sarki <i>et al.</i> , 2020
Uganda	Uganda's first 100 COVID-19 cases: trends and lessons	Olum & Bongomin, 2020
Tanzania	The first confirmed case of COVID-19 in Tanzania: recommendations based on lesson learned from China	Tarimo & Wu, 2020
Africa	COVID-19 and the State of Global Mobility in 2020	Benton, 2021
Africa	Pan-African evolution of within-and between-country COVID-19 dynamics	Ssentongo <i>et al.</i> , 2021
Continental	Prediction of the COVID-19 spread in African countries and implications for prevention and control: a case study in South Africa, Egypt, Algeria, Nigeria, Senegal, and Kenya	Zhao <i>et al.</i> , 2020
Continental	Preparedness and vulnerability of African countries against importations of COVID-19: a modeling study	Gilbert <i>et al.</i> , 2020
Kenya, Uganda	Unseen Eyes, Unheard Stories: Surveillance, data protection, and freedom of expression in Kenya and Uganda during COVID-19	ARTICLE 19 Eastern Africa, the Kenya ICT Action Network (KICTANet), 2021
Global	Community movement and COVID-19: a global study using Google's Community Mobility Reports	Sulyok & Walker, 2020
Africa	Coordinating action: lessons from early COVID-19 responses in five African countries	WHO/AFRO, 2021

emergencies (Affara *et al.*, 2021). Frequent outbreaks of diseases in the EAC could partly be attributed to the increased integration and Free Movement Protocol that allowed visa-free travel within the region by citizens of respective member states (EAC, 2010). In response to the COVID-19 pandemic in the region in March 2020, the EAC Regional Health Sector Novel Corona Virus (COVID-19) Emergency Response Plan was launched in April 2020, largely mirroring the continental response plan (EAC, 2020a).

The EAC COVID-19 Response Plan had several key activities aimed at reducing community transmission due to cross-border movements of people, building regional surveillance, enhancing case detection and case management, monitoring and coordinating responses to the pandemic, supporting research and development of future responses, and swiftly tracking the implementation of the Digital COVID-19 Tracker Tool, which helps in contact tracking and patient self-monitoring (EAC, 2020b:12). The

strategy adopted by the EAC summit was to limit cross-border movements by people, but to allow trade to continue. One of the notable initiatives was the establishment of a tracking system for truck drivers who play a critical role of transporting goods across the region, namely, the Regional Electronic Cargo and Driver Tracking System (RECDTS) (EAC, 2020b). RECDTS is a mobile phone app that allows cargo drivers to cross the border using COVID-19 digital certificates which display the COVID-19 test results and reduces the need for testing in multiple countries.

At the national level, each member state set up a national response plan mirroring the EAC Regional Response Plan. While Kenya, Rwanda, and Uganda had immediate response to the COVID-19 pandemic, Tanzania and Burundi recorded delayed responses largely blamed on political factors. The Burundi government set up the COVID-19 National Response Plan to be implemented by the Ministry of Public Health and the Fight against AIDS,

in June 2020 (Brima, 2021; Ogbolosingha & Singh, 2020). The Republic of Kenya set up the National Emergency Response Committee on Coronavirus (NERC), which was a multisectoral and multi-ministerial forum, in February 2020, following a Presidential Executive Order (Republic of Kenya, 2020a). The Ministry of Health of Kenya was the lead agency in the response plan and set out several guidelines on the management of COVID-19 in the country (Wangari *et al.*, 2021; Republic of Kenya, 2020b).

The Republic of Uganda constituted a National Task Force to combat COVID-19, in March 2020, that launched the Uganda National COVID-19 Preparedness and Response Plan, with the Ministry of Health of Uganda as a lead agency, while the Office of the Prime Minister provided the overall policy guidance. The Task Force was tasked to manage all aspects of COVID-19, including case management, health sector responses, community engagement strategies, funding and resource mobilization, and surveillance and laboratory responses. Uganda drew on the previous experience in handling the Ebola epidemic in the country and activated the subnational surveillance teams as part of the response plan to the COVID-19 pandemic (Republic of Uganda, 2020; Sarki *et al.*, 2020).

The Government of Rwanda set up a National Task Force bringing together several government agencies, that launched the Rwanda Coronavirus Disease National Preparedness and Response Plan from March to August 2020 (Republic of Rwanda, 2020). Part of the response included setting up a COVID-19 Incident Management System (IMS) as well as building national capacities for prevention, prompt detection and enhanced surveillance at community, and port of entry and health facilities (Republic of Rwanda, 2020:12). Although “migration and mobility data” are not referenced in the National Response Plan, the data could be collected as part of the “port of entry” surveillance system. Rwanda has been commended for the innovative approaches rolled out as part of the COVID-19 response, such as using robots for screening and inpatient care, using drones for distribution of medical supplies, implementing a robust public information strategy that leveraged on the experiences in managing Ebola in 2018–2019, and using the Integrated Disease Surveillance and Response (IDSR) framework (WHO/AFRO, 2021; Karim, 2021; Republic of Rwanda, 2020).

Comparatively, the Tanzanian government set up a COVID-19 Task Force in May 2021 to review the country’s response to COVID. This delayed response is attributed to a presidential directive issued in May 2020 that resulted in Tanzania not giving daily updates of COVID-19 cases in the country as reported in various media sources<sup>1</sup>.

<sup>1</sup> [https://en.wikipedia.org/wiki/COVID-19\\_pandemic\\_in\\_Tanzania](https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Tanzania) (accessed on February 8, 2022)

### 3.2. Availability and accessibility of mobility and migration data for COVID-19 response in EAC

Traditional data sources for migration and mobility, including administrative data, census, and surveys, are potentially useful in COVID-19 management. This study sought to establish if any of the EAC member states applied these data sources to inform the COVID-19 preparedness. Ideally, the countries would use such data to monitor the populations at risk, especially the migrant or mobile populations, or in the provision of services to the migrant and displaced populations in the region.

Administrative data collected at border points – land, sea, or air – is a potential source of information on who is getting into and out of the respective members state coupled with their COVID-19 status, including if tested positive for the coronavirus or not. The review of member state websites and relevant ministries did not return any confirmation of the use of administrative data in COVID-19 management. One potential source reviewed was the One Stop Border Post (OSPB) initiative, which captures daily updates of cross-border movements within the EAC region, but a study commented that the data sharing infrastructure used by OSPB was highly complex, prompting paper-based data collection (Nugent & Soi, 2020).

A second data source for migration data is the decennial population census, which collects migration data based on residence within national administrative units, as well as demographic information on migrants, such as age, sex, marital status, education level, and occupation. Two studies identified in the reviewed literature demonstrate how census data could be useful in modeling the spread of COVID-19 in Kenya. In the first study, Macharia *et al.* (2020) used census data to model the social vulnerability index for subnational regions in Kenya to determine how effectively they could handle the COVID-19 pandemic. The study showed that subnational units with higher poverty indices and with few social amenities would have weaker institutional capacity to tackle COVID-19. Based on their model, COVID-19 cases in Kenya were concentrated in the capital city, urbanized areas, and border towns, and the authors recommended that a vulnerability mapping would help mitigate the spread of COVID-19 in these regions. The study observation that COVID-19 spread faster in the urbanized areas and border towns shows the close nexus between the national migration patterns and the spread of the pandemic in Kenya, as observed in earlier studies, that migrants preferred to move to the capital city, urbanized areas and in towns located along the international borders (Muyonga *et al.*, 2021). The second study demonstrates how census data can be used to model the diffusion of COVID-19 in Kenya. In the study, Brand *et al.* (2020) used

internal migration data from the 2019 Kenya census dataset and the demographic profile of the confirmed COVID-19 cases in China to forecast the spread of COVID-19 to Kenya. One notable observation from Kenya is that the Centers for Disease Control (CDC) in Kenya advised the National Emergency Response Committee to decentralize response efforts to the hotspot areas based on patterns of population movements and COVID cases reported in the country<sup>2</sup>.

The third common source for obtaining migration data is the surveys, including specialist migration surveys that collect information regarding migrants and their livelihoods. The merits and demerits of using survey data have been well documented; of note, the application of survey data faces several limitations, such as the low generalizability of the results due to small sample size and the high cost of conducting surveys. However, due to the time lag of census data and the lack of updated population registers in contexts like Africa, the specialist migration surveys are the preferred option for more timely data (Fargues *et al.*, 2021; Muyonga *et al.*, 2020). For the EAC region, only Tanzania has used the World Bank's Living Standards Survey, which incorporates a module on migration (Muyonga *et al.*, 2020). In the review of literature, there is no evidence on the use of specialist surveys to capture information on migrants, or migration and mobility in the region, but evidence points to use of innovative methods to collect such data, as discussed in the next section.

### 3.3. Innovative sources of migration and mobility data for COVID-19 response in EAC

In the absence of administrative data, the use of mobility data based on cellphone user location data proved to be popular in studies conducted during the COVID-19 pandemic in the EAC region. Several countries resorted to using mobile phone surveys as a more efficient way to collect information from the public, especially in the wake of implementing containment measures, using the Google Mobility dataset<sup>3</sup> to map human mobility during the pandemic period (Pinchoff *et al.*, 2021; Quaife *et al.*, 2020). This is based on earlier studies that demonstrated the mobile phone penetration within the region (Wesolowski *et al.*, 2012; Tomitsch, 2010).

Sulyok & Walker (2020) documented the changes in patterns of human mobility globally, including EAC countries, by comparing changes in the mobility patterns. To monitor the trends of mobility during the lockdown period in Kenya, several behavioral patterns related to

COVID-19 among residents in five slum areas in Nairobi were assessed in joint collaboration with the Ministry of Health and Population Council, with results showing that the residents of informal settlements were still moving in search of jobs despite the lockdown measures, with up to 19% of respondents reporting that they used public transport to go to work (Austrian *et al.*, 2020).

As part of the AU monitoring structures for the continental response to COVID-19, the PERC conducted online surveys to gather public opinion on the public health measures and their effects on livelihood. In September 2021, PERC monitored mobility trends in several African countries, including the EAC region, and found that several countries still had higher population mobility in spite of the rising cases of COVID-19 delta variant infection in the region (Africa CDC, 2021b). In Kenya, Ruktanonchai *et al.* (2021) used the Google Mobility dataset to map the human mobility patterns in the 2018–2019 period in Kenya, to illustrate the levels of domestic and international travel in the pre-pandemic period, and establish what factors influenced such movements. Results showed there were two peak seasons for human mobility in Kenya, that is, in August and December, mirroring the school calendar, with the pre-pandemic period characterized by short trips within the country and longer intercounty and international trips. In Kenya, a mobile survey revealed that a spike in COVID-19 infections was attributed to non-adherence by some of the citizens to movement restriction protocols imposed by the government (Quaife *et al.*, 2020). The Google Mobility data, however, have limitations as it only captures information from mobile phones and, therefore, omits population that does not own phones. Moreover, the georeferencing feature works only if “location” setting is turned on, meaning that there may be many cases of individuals moving without the mobile phone picking up such movements. Data collected through such digital sources have faced ethical and legal challenges, especially in the domain of data privacy rights, as noted in protests by human rights activists in Kenya and Uganda who demanded for data protection laws (Article 19 Report, 2021).

Digital traveler locator apps were used to track international air travelers to ensure that they adhere to the quarantine measures through self-reporting. These include the *Jitenge App* introduced in Kenya as a home-based care self-reporting app for international travelers in July 2020 by the Ministry of Health in Kenya (Republic of Kenya, 2020c), and the *CoronaCheck*<sup>4</sup> mobile app launched in 2020 for self-evaluation and home-based screening in the Republic of Tanzania. Elsewhere, movement of truck drivers in the EAC

<sup>2</sup> <https://www.cdc.gov/globalhealth/stories/2021/cdc-supports-kenya-expanding-emergency-response.html> (accessed on February 8, 2022)

<sup>3</sup> Google LLC. Google COVID-19 Community Mobility Reports. <https://www.google.com/covid19/mobility/> Accessed on 8 February 2022.

<sup>4</sup> [https://www.aku.edu/news/Pages/News\\_Details.aspx?nid=NEWS-002200](https://www.aku.edu/news/Pages/News_Details.aspx?nid=NEWS-002200) (accessed on February 8, 2022)

region was tracked using the Regional Electronic Cargo and Driver Tracking System (RECDTS), which captured information on COVID-19 among truck drivers. Using the RECDTS database, the Uganda Ministry of Health reported that truck drivers accounted for over 80% of the COVID-19 positive cases, which, in turn, drove the accelerated rate of vaccination and more intensive tracking of truck drivers as a response measure (Sarki *et al.*, 2020:2).

Gilbert *et al.* (2020) modeled the air travel flows between China and Africa to compute the risk of importation of the coronavirus into the African countries, including Kenya and Tanzania, using *Epirisk*, a computational platform, for epidemiological modeling. The results showed that the EAC region was associated with low risk in this regard, but Kenya and Tanzania were identified as having “moderate risk” of importing the virus, while also being reported for harboring very low capacity to manage the pandemic in case; it becomes severe (Gilbert *et al.*, 2020).

## 4. Discussion

This systematic review sought to provide evidence on the use of migration and mobility statistics in the management of COVID-19 pandemic in the EAC bloc. The Global Compact on Migration calls for the use of accurate and disaggregated migration statistics for policy making in migration governance. In line with this, this systematic review seeks to investigate how migration data were utilized in COVID-19 response initiatives in the EAC region. The EAC COVID-19 Response Plan provides the overall framework for managing the pandemic in the region and was reviewed as part of the background information critical for the study. A glimpse into the strategies employed in the plan indicate that “timely data,” encompassing that of vulnerable populations including migrants, is explicitly stated, but none of the documented studies demonstrate the use of the data in the COVID management strategies.

Several data sources have been traditionally employed by the EAC member states to collect data on migration and human mobility and include administrative records, such as border control data, decennial census, and periodic surveys. Evidence shows that such data sources may not provide real-time information required during emergencies such as pandemic outbreaks, but they can be employed to provide initial model on the spread of diseases. The One Stop Border Initiative launched in the EAC region provides a repository of critical information on population mobility, including travel duration, destination, and reason for movements, all which could inform the contact tracing processes in times of the pandemics, as demonstrated in the management of

previous disease outbreaks (Kakaï *et al.*, 2020; Pindolia *et al.*, 2014). To ensure completeness and integrity of the data collected, better coordination of data collection across multiple agencies at the border posts is strongly required (Odero, 2020). The studies conducted in Kenya demonstrate how census data can model the diffusion of the disease in the country, as well as detect the regions with higher social vulnerabilities that would weaken their response systems. It is noteworthy that the CDC in Kenya, which was part of the agencies managing COVID-19 in the country, adjusted their interventions based on the observed patterns of subnational migration flows in the country, ensuring there was more vigilance in the urban areas and some of the subnational units where most of the population resided in.

A notable observation was the use of digital technology to conduct surveys of the population to test the efficacy of COVID-19 interventions in the country. Digital technology provided a quicker alternative for migration and mobility data and was widely adopted globally (Alamo *et al.*, 2020). In the EAC region, *Jitenge* and *CoronaCheck* apps in Kenya and Tanzania, respectively, demonstrate the usefulness of technology in generating real-time information on population flows. These apps enabled monitoring of health status of infected travellers and their adherence to quarantine measures when they were receiving treatments for COVID-19.

Availability and open access to global online databases to facilitate research and modeling of COVID-19 is an important pillar supporting the design of pandemic responses globally. The studies cited in this review confirmed the benefits of the Google Mobility dataset for forecasting and modeling the spread of COVID-19 in the EAC region. It is also necessary to explore other datasets, such as the Global Epidemic and Mobility (GLEaM), for modeling epidemics by combining sociodemographic and population mobility data to include different diseases and population structures (Balcan *et al.*, 2010). There were, however, ethical and proprietary considerations about the use of data generated from such sources as they are not representative of the entire population and are also prone to ethical issues. Potential misuse of such data to track perceived illegal migrants has been documented elsewhere (Gasser *et al.*, 2020), sparking the need to protect data of all people, including the migrants. In contexts where data protection laws are in place, there is reduced risk in misuse of such data (Munir *et al.*, 2015).

This review captured the interventions conducted in the 2-year period after the global outbreak of COVID-19. While efforts were made to acquire the evidence from the member states of the EAC region, there were few published studies from Burundi and Tanzania, resulting in under-



representation of the scenarios from these two countries. In addition, South Sudan – although being a member state of the EAC – was omitted from this analysis due to data paucity. Despite this, the current analysis is still able to provide a snapshot of the use of mobility and migration data in the EAC region for the first 2 years of the COVID-19 pandemic for the benefit of all EAC member states.

This review recommends that the EAC regional bloc as well as AFTCOR should critically review the application of migration and mobility data for COVID-19 response and the gaps thereof to inform future pandemic response plans. It is recommended that future pandemic response frameworks should mainstream migration statistics to better model the diffusion of the disease on one hand and to investigate the effectiveness and impact of the interventions on the mobile population, on the other. The study recommends the formation of research collaborations between the EAC secretariat and migration specialists to improve the use of, and demand for, migration and mobility statistics to improve the evidence base for managing the migration, mobility, and health interphases.

## 5. Conclusion

The COVID-19 pandemic, which has brought about wide-ranging catastrophic impacts worldwide, underscores the need for timely data to inform decision making during critical moments. This systematic review sought to identify if mobility and migration data were used in the COVID-19 response efforts in the EAC region. This review pinpoints that the continental COVID response strategy encapsulates the concept of utilizing timely data for monitoring response plans and the PERC was established to serve this important purpose. Migration and mobility data can be derived from several sources, including global mobility datasets, online epidemiological data, and mobile phone apps. There is, however, no clear evidence on the demand for such data by the governments in their specific COVID-19 response plans. This may partly be attributed to the complexities of managing pandemics and the varied data requirements by different stakeholders. Nevertheless, an integrated approach that ensures spatial capture of population on the move at times of pandemics stands out to be a potent tool for revolutionizing future response efforts.

Published scholarly work demonstrates the potential use of migration and mobility statistics to model and predict the diffusion of the pandemic within nation states or larger geographical regions. Since the traditional data sources are unable to provide real-time data relevant for pandemic response, the digital technology becomes a feasible alternative. On the same note, the huge potential of digital technology, especially in the EAC context,

to obtain migration or mobility data for strategizing pandemic response in the future remains untapped, but the legal and ethical protections need to be instated to ensure safer use of such data for future pandemics. The scope of this systematic review was limited to the immediate response to the pandemic in the first 2 years, leaving a gap on how the EAC region applied migration statistics in the response processes, which deserves further exploration in the future.

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## Conflict of interest

The author declares that they have no competing interests.

## Author contributions

This is single-authored article.

## Ethics approval and consent to participate

Not applicable.

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## Availability of data

Data used in this case report are available from the corresponding author on reasonable request.

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